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Application No. 10/646,929
Filed Aug. 25, 2003
Title: Stereo Microscope
Inventor: Dr. Paul K. Piontkowski
Examiner: Thong Nguyen
Technology Center: 2872

Substitute Appeal Brief and Response To The Office Action Of January 5, 2006

A check for $310.00 was submitted on Dec. 20 2005 which included the small entity fee of $250.00 for filing the appeal brief and $60 for a one month extension of time for filing the brief.

Please cancel the appeal brief filed Dec. 20, 2005 and substitute the enclosed substitute appeal brief.

The examiner has objected to the appeal brief as failing to comply with 37 CFR 41.37(c) (1) (v). The Summary of claimed subject matter list independent claim 12 with a concise explanation as to where the claimed subject matter is described in the specification and with all of the claimed subject being identified by reference numerals. Claim 16 is the only other claim requiring a concise explanation since it includes a means plus function. The brief includes a concise explanation of the means plus function including where such is found in the specification and reference numerals identifying such in the drawings.

Mr. Craig Feinberg at the Board of Appeals & Interferences was consulted as to the appropriateness of the presently filed appeal brief. If the examiner has any questions regarding the appropriateness of this appeal brief, he is requested to consult with Mr. Feinberg before notifying the applicant.

Respectfully Submitted,

Carroll Dority (Reg. 33148)
(301) 292-2750
Fax: (301) 292-8775
e-mail: carroll.dority@comcast.net
For
Dr. Paul Piontkowski

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Substitute Appeal Brief

Real party in interest

The real party of interest in this application is Dr. Paul K. Piontkowski.

Related appeals and interferences page(s)

None

Status of claims

Claims 1 – 11, 20, 21, 25 – 28 and 30 – 32 are allowed.

Claims 12, 15 – 17 and 22 – 24 are rejected.

Claims 18 and 19 have been withdrawn from consideration by the examiner.

Claims 13, 14 and 29 have been cancelled.

The rejection of claims 12, 15 – 17 and 22 – 24 is appealed.

Status of amendments

No amendments have been filed subsequent to the final rejection.

Summary of claimed subject matter

Claim 12. A microscope comprising: a hollow elongated body (26) having opposite ends and enclosing first and second optical paths extending through said hollow elongated body (26), two oculars (27) mounted at one of said ends, each ocular (27) including a lens assembly (28), a prism assembly (31) in each optical path adjacent each ocular (27), a lens magnification changer (33) rotatably mounted (at 34) about an axis and located intermediate the ends of said hollow elongated body (26), a first series of bores (35) located about the periphery of said lens magnification changer (33) in a common plane and extending diametrically through said lens magnification changer (33), a second series of bores (36) located about the periphery of said lens magnification changer (33) in a common plane and extending diametrically through said lens magnification changer (33), a lens assembly located in each bore of said first (35) and second (36) series, the other of said ends of said hollow elongated body including an objective lens (32), a first of said optical paths extending through one of said oculars (27) to one of said prism assemblies (31), through one of said first series of bores (35) of said lens magnification chamber (33) and through said objective lens (32), a second of said optical paths

extending through the other of said oculars (27) to another of said prism assemblies (31), through one of said second series of bores (36) in said lens magnification changer(33) and through said objective lens (32), one or more light emitting diodes (43) located in said hollow elongated body (26) adjacent said objective lens (32).

A detailed description of the subject matter of claim 12 may be found in paragraphs 8 – 11 of the specification.

Claim 16. A microscope as set forth in claim 12, including means (29, 30) pivotally mounting said oculars (27) in a plane that is common to said first and second optical paths.

A detailed description of the subject matter of claim 16 appears in paragraph 8 of the specification. The oculars (27) are pivotally mounted by a means such as the pivots 29 and 30, as illustrated in Fig. 1 of the drawings, so that they move in a common plane. The lines of sight for both oculars (27) lie in a common plane as noted by the dashed lines in Figs. 1 and 2. The plane in which the oculars pivot is the same plane as the plane in which the lines of sight lie.

Grounds of rejection to be reviewed on appeal

Whether claims 12, 15 and 24 are unpatentable under 35 U.S.C. 103(a) over Takizawa et al (U.S. Patent No. 4,396,260) in view of Yamamoto et al (U.S. Patent No. 5,442,489) and Harooni et al (U.S. Patent No. 5,841,509).

Whether claim 16 is unpatentable under 35 U.S.C. 103(a) over Takizawa et al, Yamamoto et al and Harooni et al as applied to claim 12 and further in view of Blaha et al (U.S. Patent No. 4,175,826).

Whether claim 17 is unpatentable under 35 U.S.C. 103(a) over Takizawa et al, Yamamoto et al and Harooni et al as applied to claim 12 and further in view of Fukaya (U.S. Patent No. 5,420,716).

Whether claims 22 = 23 are unpatentable under 35 U.S.C. 103(a) over Takizawa et al, Yamamoto et al and Harooni et al as applied to claim 12 and further in view of Fogle (U.S. Patent No, 3,434,772).

Argument

The rejection under 32 U.S.C. 103(a) of claims 12, 15 and 24 as being unpatentable over Takizawa et al in view of Yamamoto et al and Harooni et al is considered improper.

Claim 12

The examiner states in the Final Rejection that "Takizawa et al meets all of the features of the inventive device except the feature related to the light source used in the illumination system". The claim recites "a first series of bores [35] located about the periphery of said lens magnification changer [33] in a common plane and extending diametrically through said lens magnification changer [33]", "a second series of bores [36] located about the periphery of said lens magnification changer [33] in a common plane and extending diametrically through said lens magnification changer [33] in a common plane, "a lens assembly located in each bore of said first and second series". This is not taught in Takizawa et al or any of the other references. The member 21 in Takizawa et al has two bores located in a common plane at each side of the member 21 and extending diametrically there-through. One of the bores on each side has a lens assembly (12a or12b). The other bore (22a or 22b) on each side is a clear passage for photography (see col. 3, lines 20-24) and has no lens assembly.

The claim recites "one or more light emitting diodes [43] located in said hollow elongated body [26] adjacent said objective lens [32]" which is located at an end of the elongated body forming the microscope. This is not taught by any of the prior art.

In the patent to Takizawa et al, the light source 3 is not disclosed as a light emitting diode and is positioned at a remote location away from the microscope and not located in the housing of the microscope adjacent an objective lens. In the Harooni et al patent, the light source 145 which may be a light emitting diode, is located in a housing 130 offset from the main viewing housing at 125,125'(note Fig.1) and uses a mirror 160 to direct the light toward the lens 170 (the lens 170 does not appear to be located in the housing 125,125' and the light emitting diode is not located adjacent the lens as called for by claim 12). There are times when a clinician using the applicant's invention in a surgical or analytical procedure must look above the oculars and the structure of a housing as at 130 in the Harooni et al patent would tend to obscure his vision. In the Yamamoto et al patent, the device disclosed is not a microscope of the type claimed but is an optical and electrical imaging device including a monitor display which is held in the hand to view an object M. Also, the lamps such as at 23 in Yamamoto et al which may be light emitting diodes are not located adjacent an objective lens located in an end of an elongated housing forming a microscope as recited in the claim..

Placing the one or more light emitting diodes adjacent the objective lens in the hollow elongated body forming the microscope and at an end of the hollow elongated body would not be an obvious matter of choice to one of ordinary skill in the art and accomplishes three major goals. Before explaining the rational, it is important to understand the dynamics of the light emitting diode (LED). The LED or light emitting diode is a microchip that when a controlled amount of energy is applied will emit light at

a very specific wavelength. It is a very desirable property because color of light can effect how the human eye perceives an image. This is very important when evaluating human structures. When specific colors are cast onto or through human tissue, a diagnosis of a specific disease or the presence of other anatomical structures can be identified. For example, in the presence of pure green light, disease tissue takes on a black color as where normal structures present as a light gray shade. Underlying blood vessels in normal tissue appear as black lines which aid the surgeon in his identification to prevent unnecessary damage to the vessel or closely associated nerves. Amber colors permit dentist to place restorative materials in a well lit environment without causing them to set prematurely to insure ideal placement. Pure white light provides undistorted color for proper identification of structures as well as flooding the operative field with bright light and improves visualization because high quantities of pure light are necessary to produce a clear image with high magnification. Poor light causes the image to appear fuzzy. The LED emits light readily at low levels of energy, and produces no heat emission in the lights path, the light that is produced is diffused at a very high angle from the diode causing the light to be disbursed very rapidly. This is an undesirable feature because a microscope has a working distance of 10 to 20 inches from the end of the objective lens. A LED cannot cast a concentrated light more than an inch or two. This is a major concern to overcome when considering its use in a surgical microscope.

Reasons For Placing The LED In Close Proximity To The Objective Lens

(1) If a condensing reflector is placed in close proximity to a LED, it will gather the dispersion of light and condense the light into a divergent cone (beam) that can be redirected. Passing this beam of light through a powerful lens such as the objective lens on the front of the microscope will cause the beam of light to be focused at the specified working length of the objective lens. The result is bright, pure, focused light on the operating field that will greatly enhance the operation of the microscope. Condensing and focusing the beam of light allows for good light quality and quantity at the proper working distance. LEDs mounted outside of the microscope body and wherein light is not passed through the lens would not supply enough light at any reasonable length. In the patent to Yamamoto et al, the LEDs 23 are not placed adjacent an objective lens and the image pick-up apparatus 1 is placed on the object to be lighted and observed. This would not be adequate for a surgical microscope of the present invention which allows a short working distance for instrumentation to be passed to the operative site, not to mention the poor ergonomic position the clinician would have to work in.

(2) Placement of the LEDs adjacent to the objective lens would enhance the quality and quantity of light on the operative field to the operator's line-of-sight. This is referred to as coaxial lighting and is very critical to the performance of the surgical microscope. Light that travels along the same path as the clinician's line-of-sight is unobstructed by adjacent structures. If the light is in the same path as the visual path, one can guarantee that all of the light that is directed at the object being viewed will reach the object. If some adjacent structure to the operative field were to block the light, it would also block the visual field,

hence causing the operator to adjust his position to visualize the field properly. By not passing the light through the same objective lens as the one used for the visual field, it would result in an altered path of the light to the visual path creating an intercept or convergent angle for the two paths to meet at the objective field. Since we are magnifying objects greatly with the microscope, we tend to look at very miniscule points where even a 5 degree convergent angle could cause most of the light to be trapped on the adjacent structures. For example, when one looks down the canal of a root of a tooth, the canal diameter may not exceed 0.2 millimeters, however the length of the canal could be 25 millimeters long. It is very easy to understand that even a very slight convergent angle would cause the light to become trapped on the surface of the tooth and not allow for sufficient light to travel down the canal to allow the clinician to see the condition that exists in this confined space. The outcome would result in ultimate failure of the procedure.

(3) Placing the LEDs inside the microscope body and adjacent to the objective lens improves the compact nature of the microscope design. Since the microscope of this invention is worn continuously in front of the clinician's eyes, when he is not peering through the microscope, the ability to see around the microscope is imperative. The ability to visually monitor the patient, staff and instrumentation is critical to performing a procedure. An appendage protruding from the microscope would not only hinder the peripheral vision, it would also add significant weight which is detrimental to the design.

Claim 15

Claim 15 recites a reflector located behind the one or more light emitting diodes and a pivotally mounted light filter located in front of the one or more light emitting diodes. Harooni et al nor any other reference of record discloses a microscope having an objective lens, one or more light emitting diodes in the microscope and located adjacent the objective lens, a reflector located behind the one or more light emitting diodes and a pivotally mounted light filter in front of the one of more light emitting diodes. The examiner has not shown this combination to be old nor has he submitted evidence that such would have been an obvious modification to one of ordinary skill in the art. See the arguments regarding the reflector as set forth above for claim 12.

Claim 24

Claim 24 recites that the first and second optical paths lie in a common plane which is not taught by the prior art. The examiner states on page 4 of the final rejection that the first and second optical paths in the Takizawa et al patent are in the same plane. The examiner has not analyzed the Takizawa et al patent correctly. The first and second optical paths are not in the same plane. Fig. 2 of Takizawa et al shows a side view of the optical paths. Note that the optical paths take a step down through the prisms 14a and 14b. The beginning of the optical paths are in a different plane from the later parts of the optical paths. The primary reason for placing the optical paths in a common plane is to improve on the line-of-site feature of the microscope. Traditionally when using a prism assembly in the ocular tube, a step down feature permits the visual path to be varied to fit the individual's interpupillary distance without changing the parallel channels of the optical paths (the right and left eyes). This makes fabrication of the microscope easier but it creates an intercept angle from the individual's true line-of –sight and the optical line-of-sight of the microscope. When utilizing the head mounted design of the present invention, this introduces visual distortion from the individual's true site line and makes the microscope difficult to utilize. When incorporating the traditional step down optics, the design of the microscope necessitates a very narrow parallel path of the two optical channels. This is typically 22 millimeters on center which allows for an easier design to adjust the width of the ocular to fit the individual. This feature is great for optical convenience, however, it creates a pseudo-stereoscopic image that results in a very poor three dimensional image and poor spatial relationship. By placing the optical paths in a common plane, the two ocular channels can be separated to a more typical interpupillary

distance which creates a true stereoscopic image and restores a realistic spatial representation. The image is not distorted because the optical line-of-sight coincides with the individual's line-of-sight. If the object is 12 inches away, it appears to be 12 inches and it is easier for the individual to judge accurate depth perception. The same also applies to the dimensions of the microscopic object that is being viewed. When a common plane of optical paths is established, the ocular tubes need to be pivoted from the exit point of the primary optical magnification chamber to maintain the optical plane that is established from the object to the individual's pupil. Since each optical channel (right and left) that is established in the primary magnification chamber is a fixed distance, the pivoting action will require a sophisticated prism or mirror system to redirect the optical angle to the eye and maintain the common optical plane that is unique and an important aspect of the invention. Conventional microscopes rotate the ocular tubes around the primary channel to accomplish the interpupillary modification which is a much simpler design. However, it creates a step or alteration of the common primary ocular path which results in a secondary parallel path to the individuals pupil. This creates the intercept angle in conventional microscopes and contributes to the visual disorientation associated with this type of microscope.

The design of the microscope of the present invention permits for a compact, streamline microscope that is lighter which assists in its mobility and improves the peripheral vision of the clinician. This common optical plane design is not incorporated into traditional microscope designs because there is no need to create a compact light weight scope for the traditional setup. A head mounted, line-of-sight microscope requires a much more sophisticated design. Since there is no teaching of this subject matter and there is no showing that such would have been obvious to one of

ordinary skill in the art , the claim should be allowed.

Claim 16

The rejection of claim 16 under 35U.S.C. 103(a) as being unpatentable over Takizawa et al, Harooni et al and Yamamoto et al as applied to claim 12 and further of Blaha et al is considered improper. This claim calls for the first and second optical paths to lie in a common plane which is not taught in Takizawa et al as explained above for claim 24 nor any of the other prior art. Further, the claim recites that the oculars are pivotally mounted in a plane that is common to both the first and second optical paths which is not disclosed in any of the prior art cited. There is no proper evidence submitted by the examiner showing that it would have been obvious to one of ordinary skill in the art to modify the microscope in the Takizawa et al patent to meet the limitations of claim 16.

Claim 17

The rejection of claim 17 under 35 U.S.C. 103(a) as being unpatentable over Takizawa et al, Harooni et al and Yamamoto et al as applied to claim 12 and further in view of Fukaya is considered improper. In the Fukaya patent, the adjustable support arm as illustrated in Fig.2 for example is attached by a rigid connection to the microscope. Claim 17 recites that an end of the adjustable arm [1,2,3,4] is connected to the microscope by a connection allowing pivoting at the microscope in any direction and also that an attachment connects

the microscope to the head of an operator. This pivotal connection is ball joint 16. There is no pivotal movement at the connection between the adjustable arm in the Fukaya patent and the microscope. Note in Fig. 4 of the appellant's invention that if the ball joint 16 were eliminated and there was a rigid connection of the adjustable arm at the microscope, when the clinician would move his head to either side for example the pivot would be ball joint 15. This would require that the clinician lift most of the weight of the microscope with his head resulting in an annoying, tiring strain on the head. Such would be undesirable when performing clinical or analytical procedures. Since the prior art does not teach the recited features of claim 17 and the examiner has not submitted evidence that such a modification would have been obvious to one of ordinary skill in the art, claim 17 should be found allowable.

The rejection of claims 22-23 under 35 U.S.C. 103(a) as being unpatentable over Takizawa et al, Harooni et al and Yamamoto et al as applied to claim 12 and further in view of Fogle is considered improper

Claim 22

The Fogle patent does not disclose two oculars, prism assemblies and a lens magnification changer mounted on a base section of an internal mount located within a hollow elongated body of a microscope. The examiner has not described how the microscope of Takizawa could possibly be modified using the teachings of Fogle to include the limitations of claim 22 nor is there any evidence that such a modification would have been obvious to one of ordinary skill in the art. Mounting the two oculars,

prism assemblies and magnification changer on the recited base section simplifies the assembly of the microscope and cuts cost of production over conventional microscopes.

Claim 23

This claim states that the hollow elongated body [26] which encloses the two optical paths is formed by shells [49,50] fastened together and enclosing the internal mount [55]. This is not taught in the Fogle patent nor any other art of record and the examiner has not presented any proper evidence showing that it would have been obvious to one of ordinary skill in the art to modify the Takizawa et al to incorporate these features or how the Takizawa et al patent could be modified in such a manner. Claim 23 should be considered as allowable.

Claims Appendix

12. A microscope comprising: a hollow elongated body having opposite ends and enclosing first and second optical paths extending through said hollow elongated body, two oculars mounted at one of said ends, each ocular including a lens assembly, a prism assembly in each optical path adjacent each ocular, a lens magnification changer rotatable mounted about an axis and located intermediate the ends of said hollow elongated body, a first series of bores located about the periphery of said lens magnification changer in a common plane and extending diametrically through said lens magnification changer, a second series of bores located about the periphery of lens magnification changer in a common plane and extending diametrically through said lens magnification changer, a lens assembly located in each bore of said first and second series, the other of said ends of said hollow elongated body including an objective lens, a first of said optical paths extending through one of said oculars to one of said prism assemblies, through one of said first series of bores of said lens magnification changer and through said objective lens, a second of said optical paths extending through the other of said oculars to another of said prism assemblies, through one of said second series of bores in said lens magnification changer and through said objective lens, one or more light emitting diodes located in said hollow elongated body adjacent said objective lens.

15. A microscope as set forth in claim 12, further including a reflector behind said one or more light emitting diodes and a pivotally mounted light filter in front of said one or more light emitting diodes.

16. A microscope as set forth in claim 12, including means pivotally mounting said oculars in a plane that is common to said first and second optical paths.

17. A microscope as set forth in claim 12, further including a wall, ceiling or vertical support mount, an adjustable arm attached at one end to said support mount and at an opposite end to said microscope by a connection allowing pivoting at the microscope in any direction and for supporting and positioning said microscope, an attachment connecting said microscope to the head of an operator for positioning of the microscope by the head of an operator.

22. A stereo microscope as set forth in claim 12, wherein said two oculars, prism assemblies and lens magnification changer are mounted on a base section of an internal mount located within said hollow elongated body.

(23) A stereo microscope as set forth in claim 22, wherein said hollow elongated body is formed by shells fastened together and enclosing said internal mount.

(24) A microscope as set forth in claim 12, wherein said first and second optical paths lie in a common plane.

Evidence appendix

(None)

Related Proceedings Appendix

(None)